

1951

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672

*Airplane hunting for
hemlock looper control, see p. 10.*

**Washington
Forest Fire
Association**

949 HENRY BUILDING

Seattle



TWENTY-FOURTH
ANNUAL REPORT

1931

Twenty-fourth Annual Report
OF THE
Washington Forest Fire
Association
1931

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O. BYSTROM, *Secretary*

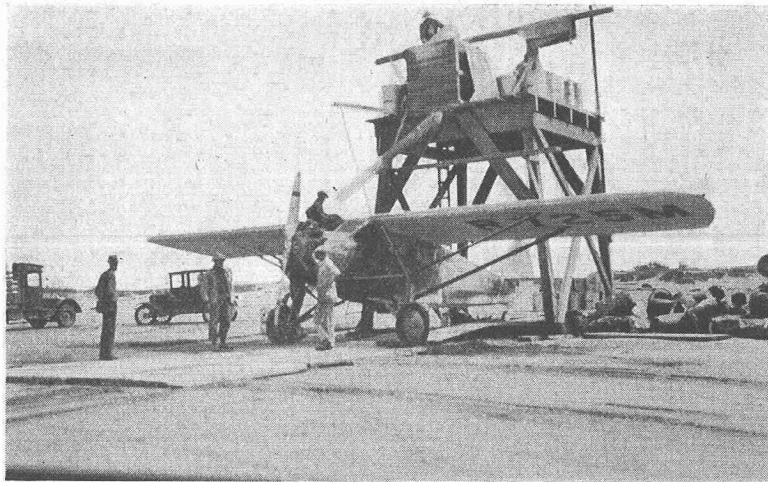
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SEATTLE, WASHINGTON



LOADING PLANE WITH CALCIUM ARSENATE
HEMLOCK LOOPER CONTROL—PACIFIC COUNTY



DUSTING FOR HEMLOCK LOOPER CONTROL
PACIFIC COUNTY

Report of the President

TO THE MEMBERS OF THE WASHINGTON FOREST FIRE ASSOCIATION :

From the report of your Chief Fire Warden and Secretary, a complete picture may be secured of this year's activities and its particular problems. This is the 24th annual report of the Washington Forest Fire Association and, together with those preceding it, forms a comprehensive history of our organization's aims and accomplishments. I feel it is a history of progress but I feel too that if we are to meet new problems constantly arising and rapidly changing conditions, progress in the future must be even more marked and rapid than that of the past.

In keeping with the needs of the times, it has been the object of officers, trustees and executives during the past year to exercise unusual care that all unnecessary expense be eliminated. Forest protection is, however, a project in which surprises are not unusual and delayed action is often costly. During the past season, the first of these unusual and expensive occurrences was a prolonged spell of bad fire weather during April when a period of unexpected low humidity prevailed. Many fires sprung up during this period and, eventually, covered an area of over 70,000 acres, mostly cutover land. Our field organization was not on duty at this early date and in fighting these early fires over 25% of the entire year's fire fighting bill was incurred, which proved a heavy handicap to overcome.

Again our economic situation took a hand to make difficult our desire for a season of low protection costs. Incendiary fires were more frequent than in the past and caused the expenditure of a very large sum for their suppression, as shown by the report of our Chief Fire Warden. It is these unpredictable causes of fires and expenses which renders well-nigh impossible any accurate forecast of a season's liabilities.

In spite of handicaps, however, there was considerable reduction in major items of expense and the total for the year will compare favorably with the preceding one.

During the past year considerable time and some expense was involved in helping to control a Hemlock Looper attack in Pacific County. This particular enemy is a defoliator which in the past has several times caused heavy damage to stands of timber in the Pacific Northwest and the Pacific County outbreak was one of major proportions. The state, county, and interested private owners cooperated in conducting an airplane dusting project which, there is reason to believe, will materially check further spread of the insects. Prompt action by the state and county, when the gravity of the situation was brought to their attention, as well as the invaluable aid of the U. S. Bureau of Entomology, cannot be too highly commended.

From the standpoint of measurable damage sustained through fire, the past season compares favorably with the preceding one. Loss of merchantable timber was only about one-third of that of 1930, logs were destroyed in a somewhat greater proportion, principally by reason of more "cold deck" fires, and logging equipment also suffered to a somewhat greater extent. The total area burned over also exceeded that of 1930 by some 15,000 acres, which is accounted for several times over by early fires above referred to.

The Association lookout system was this year further augmented by development of three new points. This system is proving of great value in detecting fires in increasing effectiveness of our patrol system. In conjunction with Forest Service Lookout Stations, our system will prove of increasing benefit to timber owners. Use of tractors in building fire trails was further developed, demonstrating the economy in use of such equipment.

Mention should also be made of the law enacted by the last legislature whereby deforested areas may be classified and placed in a special class for taxation purposes. Action to put this law in operation is now under way and very shortly it is expected the first areas to come under its provision will be acted upon. It is expected that this law will benefit alike the state, county and land owners.

As usual, we have the past year experienced hearty cooperation on the part of the State Forestry Department directed by George C. Joy; the Federal Forest Service; the Western Forestry and Conservation Association; U. S. Weather Bureau and the Bureau of Entomology. To each of these agencies we express appreciation and pledge continuance of our endeavors to harmoniously work out our common problems.

I desire also to express appreciation for the special effort put forward by our Chief Fire Warden, Secretary, and all of the Field Force during these trying economic times and in the face of some very unusual conditions arising in protection activity. By persistent and concerted action much has been accomplished and greater accomplishment will be recorded in the next succeeding years.

J. L. BRIDGE, *President.*

Statement of Cash Receipts and Disbursements For the Year 1931

RECEIPTS

Cash on hand, January 1, 1931.....	\$ 2,269.01
Collections during year:	
Assessments for year 1931.....	\$131,637.40
Assessments for prior years.....	1,918.21
State Patrol contracts.....	58,646.70
Loans from bank.....	4,000.00
Insurance received on equipment burned.....	439.05
Sales of equipment.....	112.73
	<u>196,754.09</u>
	<u>\$199,023.10</u>

DISBURSEMENTS

Patrol salaries, wages and sundry expenses.....	\$ 83,097.63
Field expenses	35,457.41
Fire expenses	43,913.34
Improvement work, trails, roads, etc.....	1,160.39
Publicity	91.57
Sundry tools and equipment.....	1,405.88
Automobiles and fire trucks.....	1,897.60
Pumps	520.00
Fire hose	1,321.90
Office furniture and fixtures.....	13.50
Office expenses, salaries, rent, telephone, etc.....	9,949.15
Stationery, printing, postage and supplies.....	1,183.95
Interest paid	35.33
Proportion of insect control expense.....	924.08
Notes and accounts payable (December 31, 1930).....	17,375.28
	<u>\$198,347.01</u>
Add—Refund of illegal assessments.....	50.40
	<u>\$198,397.41</u>
Balance—Cash in bank, December 31, 1931.....	625.69
	<u>\$199,023.10</u>

Note—At December 31, 1931, there were expenses unpaid in the amount of \$8,640.68.

To the Board of Trustees of the
Washington Forest Fire Association,
Seattle, Washington:

We have examined the books of the Washington Forest Fire Association and have prepared therefrom the foregoing Statement of Cash Receipts and Disbursements for the year 1931. The recorded income for the year has been substantiated by an examination of the members' accounts and other data, the disbursements were verified by an examination of the relative vouchers and paid checks and the cash in bank at December 31, 1931, was reconciled with a certificate received by us directly from the depository.

PRICE, WATERHOUSE & CO.

Seattle, Wash.
January 15, 1932.

Secretary's Report

Covering Operations for the Year 1931

The forest fire season of 1931 proved in many respects similar to the preceding year. In April extensive fires in logged off areas occurred, which extended into May and called for large expenditures for fire fighting. Favorable weather conditions during June helped to keep expenses down and as this fire season terminated early in September the total amount expended during the year was considerably less than for the year 1930.

Cash disbursements for 1931 were \$180,971.73, which with unpaid bills and accounts carried over of \$8,640.68, shows expenses for the year aggregating \$189,612.41, against a total for 1930 of \$210,502.45, a decrease of \$20,890.04.

All vouchers, books and accounts of the Association have been submitted to Price, Waterhouse & Company, C. P. A., for audit and check and reference is made to the report of said firm published on foregoing page, which shows receipts and disbursements for the year.

Assessments called by the Trustees for 1931 were 4½ cents per acre.

Lands listed with the Association for 1931 aggregated 2,965,197 acres against 3,088,052 acres for 1930, a decrease of 122,855 acres.

Fire fighting tools and equipment now owned by the Association are as follows:

Sundry Tools	value \$ 3,044.00
Automobiles and Fire Trucks.....	6,840.00
Pumps	2,985.00
Fire Hose	3,150.00
Weather Instruments	110.00
Office Equipment	397.00
Garage and Warehouse.....	2,000.00
	<hr/>
	\$18,526.00

The Association entered into a contract or agreement with the Department of Conservation & Development of the State of Washington for patrol and protection of 2,133,515 acres of forest lands under the Forest Patrol Laws of the State. Said lands located in the various counties of Western Washington, being designated by the State Supervisor of Forestry. This area consisting of both timbered and logged off lands were taken care of by the Association at the same rate per acre as charged to members, 4½ cents per acre. For this service payments are to be made to the Association as assessments are collected under the provisions of said law.

The membership in the Association at the end of 1931 consisted of 226 individuals and corporations.

O. BYSTROM, *Secretary.*

Report of Chief Fire Warden

TO THE TRUSTEES OF THE
WASHINGTON FOREST FIRE ASSOCIATION :

I herewith submit the twenty-fourth annual report of the Washington Forest Fire Association.

The past fire season was one of rather extraordinary peaks of fire occurrence and fire weather. The fire season started with a rush in mid April. On April 18th, the relative humidity began a sharp downward dropping curve, reaching 30 per cent at 5:00 P. M. On April 19th, it dropped to 26 per cent at the same hour, rising to a maximum of 64 per cent at 5:00 A. M. on April 20th. From this time it again dropped, reaching 30 per cent at 10:00 A. M. and 14 per cent at noon. The humidity then remained below the danger point of 30 per cent for a period of eight hours on this date. The forest condition could then be likened to exposure in a huge dry kiln. At 5:00 A. M. on April 21st, it had risen to 48 per cent and by 3:00 P. M. was down to 28 per cent, rising to but 32 per cent at midnight. This rise did not offer any amelioration of the fire hazard whatsoever. At 5:00 A. M. on April 22nd, a humidity of 28 per cent was registered, dropping to 17 per cent at 5:00 P. M., and did not rise above 40 per cent until 11:00 P. M. April 23rd, when it reached 48 per cent for a period of a few minutes only, dropping sharply again to 38 per cent at 5:00 A. M. April 24th, and 28 per cent at 5:00 P. M. the same date. A slight betterment of this condition was noted on April 26th and 27th, and on April 28th humidities and temperatures again became normal.

The period April 19th to April 28th was therefore one of extreme fire risk. At this period of the year, the dead vegetation of the previous summer's growth becomes light and tindery, and needs but a spark to start a fire which is beyond control almost from the first. As invariably happens, the low relative humidities were accompanied by high winds, naturally increasing the danger of rapid spread. The official closed season was not yet in force, and many ranchers had set out land clearing fires. While nearly every April shows a period of low humidity for a few days, yet past experience shows that such periods are relatively short, both as to hours per day and number of days. Meteorological records do not show any instance of continuous low humidity such as was experienced during the period of April 19th to 28th, 1931. Many ranchers' fires, therefore, escaped control, which under normal circumstances would have been safe.

A great deal of damage to young growth and logged off land occurred at this time. Fires were out of control once they got a start, and any slash area afire was an inferno. Spot fires were started over two miles from the main fire body. During this period of high hazard, when the field force was not yet on duty with its equipment,

some \$11,876.00 out of a total for the season of \$44,852.00, or 26.5%, was expended in fire suppression. The area burned over was 72,703 acres, or 49.7% of the total burned over for the season. Never in the history of the State has cause existed for such pre-season expenditures to control fires, but the weather conditions outlined in the foregoing paragraphs, shows both the reason and the need.

The month of May produced a sub-normal rainfall, the departure being 45%, or almost one-half the normal, following the extremely hazardous April. This meant that all fires had to be patrolled for a much longer period than the time of year would have normally rendered necessary, increasing costs to that extent.

June, however, brought a marked change. Heavy rains fell, far above normal, the departure being plus 138 per cent. In terms of per cent this looks large, but the normal is 2.17" and the actual fall was 5.14 inches. This is the average rainfall taken from the Seattle, Centralia, Aberdeen, Yacolt and Skagit Stations.

The situation was considerably eased but even the increase in June rainfall could not wipe out the losses or expenditures already incurred. Taking certain selected Weather Bureau Stations, as outlined above, as being indicative of the precipitation coverage of the State, we find that July was deficient 35% in normal rainfall, August 20.6% and September came to the rescue with a plus rainfall of 49%. This rainfall in excess of the normal for September can only be termed providential.

Owing to the employment situation, incendiary fires sprang up in every direction once the fire season started, taxing the efforts of the field staff to the full. The percentage of the total seasonal fire expense paid to suppress incendiary fires amounted to \$15,778.00, or 35.3 per cent of the total. If the pre-season expenditures of \$11,876.00 are deleted, the total expended for suppressing incendiary fires between May 1st and September 30th, amounts to 47% of the total.

The heavy rainfall after the first week in September meant the end of the fire season, and most of the field men, who had given so loyally of their efforts, had to be laid off somewhat earlier than usual because of treasury depletion. This is a matter for regret, for it was hoped to start improvement work looking towards increased protection, during the fall months, but in the face of conditions, no further expenditures were authorized.

Improvements.

During the year, three major Lookouts together with the necessary telephone lines, roads and trails were constructed. One Lookout was erected on Powder Horn Peak, in Section 19, Township 6, Range 2 East. This Lookout was used as a secondary Lookout during the year 1930, and was taken into the main Lookout system following this period of conservation. Green Mountain Lookout was reconstructed, the tower being taken to a total height of 97 feet. This new

construction means that a great deal more territory is brought under observation, and the efficiency of the Lookout increased to such an extent that the major number of fires in the Kitsap and Mason County District were first spotted and reported from this point. Speed of observation means speed in control and reduced expenditures.

Four miles of new telephone wire were strung on this project, as the tie to old line was rendered useless by the change put into effect by a logging company.

A new Lookout station was erected in Grays Harbor County. This Lookout station ties in with Capitol Peak, Minot and Green Mountain Lookouts, as well as certain U. S. F. S. Lookout stations.

The caterpillar tractor and plow, stationed in Seattle, worked a total of 210 hours, divided between construction projects and building fire trail, while the tractor and plow stationed at Chehalis worked approximately the same number of hours. It was again demonstrated that on suitable ground, that this combination is by far the quickest and cheapest method of building fire trail.

Some 26½ miles of patrol road was built and graded during the off periods. These roads are designed primarily for patrol roads through logged off reforesting areas which are paying for protection. On completion of such roads, which are in all cases private, a gate is constructed and the area closed to the general public.

Throughout the area covered by the Association 24 miles of new trail was opened; trails brushed out amounted to 65 miles; new roads constructed, 26½ miles; new telephone line, 9½ miles, and rebuilt telephone line, 23 miles. All the work was done by concentrating the field men during periods afforded by low fire hazard weather. During the course of the fire season over one hundred miles of fire trail were built with the use of the caterpillar and plow, again demonstrating its feasibility as a piece of fire fighting equipment.

Reforestation Lands.

It becomes obvious that if the Act designed to allow timber land owners the right and opportunity to hold land for reforestation is to be of real value, that an effective patrol and lookout system is not only desirable, but essential.

The Reforestation Act is now in force, and a certain acreage will be examined this tax year and placed upon the Assessment Rolls at the value fixed by law. Such areas must be protected, and the best and quickest method appears to be the conversion of the many miles of abandoned railroad grade into auto roads, to provide for rapid transportation.

This Association in conjunction with the State, is now doing more and more of this work. The acquisition of the tractor has made this work possible.

In addition to roads, many miles of trail were brushed out and constructed, and telephone lines rebuilt and some miles of new line erected. Over 100 miles of trail in the various districts was thus opened up or rebuilt, and 13 miles of telephone line reconstructed, while 17 miles of new line construction was effected.

Insect Control (Hemlock Looper)

During the fall of 1930, studies were made of an infestation of Hemlock Looper (*Ellopiia Fiscellaria*) in Pacific County. This pest is one of the most destructive insects which occur periodically in epidemic form. It was known that the last Pacific Coast Looper outbreak, occurring in Tillamook County, Oregon, about the year 1920, resulted in the complete killing of some 500,000,000 feet of standing timber, mainly Douglas fir. It thus became necessary for some central authority to organize the scattered land ownerships, so that an effective method of control could be initiated if the timber affected was to be safeguarded.

To this end, your Association, acting in conjunction with the several land owners and the Bureau of Entomology, as represented by Mr. F. P. Keen, of Portland, had an aerial photographic map made of the infested area, and upon the photographs so made, presented the findings to Governor Roland H. Hartley, in order that the State might assume its proper share of the cost in proportion to its timber interest. It should be noted here that over 40,000 acres of land, mainly virgin timber, are owned by the State within or adjacent to the boundaries of the area affected. The total area infested with Looper, described by the perimeter of infestation, is 32,000 acres.

The plan of control proposed was to follow the methods put into successful practice by the British Columbia, Quebec and Wisconsin authorities. This method was to "dust" the trees with the chemical Calcium Arsenate, distributing this at the rate of between 18 and 20 pounds per acre.

Governor Hartley quickly recognized the gravity of the situation, and once decided as to his course, gave his fullest support to the plan. He instructed the Department of Conservation and Development to co-operate with the Pacific County officials and the private owners. Mr. Erle J. Barnes, Director of that Department; Mr. C. W. Karney, Assistant Director, and State Supervisor of Forestry, Mr. George C. Joy, were most important factors in supporting and developing the scheme as finally worked out and adopted. Mr. Barnes placed Mr. T. S. Goodyear, Assistant Supervisor of Forestry, in the field to represent the interests of the State. This choice was most certainly a happy one, and to the intelligent energy of Mr. Goodyear, no small part of the success of the operation is due.

The County Commissioners of Pacific County also made a cash contribution towards control measures, and in addition placed at the service of those in charge of the scheme, every possible help that was needed. Senator Fred Norman was always helpful in matters per-

taining to Pacific County. It was a pleasure to work with such co-operation from the interested authorities, more especially in view of the magnitude of the task and its strangeness. The scheme as at first developed from a study of such data as was available, was somewhat nebulous. No experience could be fallen back upon which dealt with an infected area of the magnitude found in Pacific County. Other known operations were on a comparatively small scale, and blocked out by roads, etc. The area involved in Pacific County was approximately 6,000 acres of infested areas within a boundary outline of 32,000 acres. The cost of previous dustings was shown to vary from \$6.00 per acre to \$8.00 per acre dusted. Such a figure meant that sufficient funds could not be raised in time to do any good, and further it was doubtful if even the State or private owners could afford to co-operate on such a financial basis, when the final results could not be accurately forecast.

After a most complete study of the reports of the operations conducted in the points enumerated above, it was felt that the cost could be at least cut in half by sufficiently planning the control operation and correcting the various deficiencies and delays due to mechanical defects, as outlined in the reports studied. It was felt that we could profit sufficiently by previous experience to do this. Your Chief Fire Warden was to represent the private owners, and in consultation with the other interested parties, a scheme was developed whereby better plane loading and carrying facilities and quick dispatching arrangements were made.

An open tender on the flying contract was awarded to the Northwest Air Service, Inc., of Seattle. This Company reconstructed a Ryan Monoplane, powered with a 300 horse power Wright engine, so as to take a pay load of 1,000 pounds per trip. Dusting was to be done at a height of not more than 40 feet above the tree tops. Flying time was paid for actual flying and loading time. Other precautionary provisions were included in the tender form.

The plan as developed called for a minimum of forty flying hours, but it was estimated that a total of fifty-four hours would be needed. This was based upon an estimate of 5,400 acres to be dusted, flying strips 140 feet apart, a plane speed of 90 miles per hour, and a dust load of 1,000 pounds, to be distributed at the rate of 20 pounds per acre or 50 acres per load. Distance from the base, loading time, and flying to the infested area completed the factors in the equation that showed the dusting could be allowed for on the basis of 100 acres per hour. After locating a base at Ocean Park, estimates were made allowing 30 minutes per round trip. The loading of 1,000 pounds of calcium arsenate into the plane each trip, counting the time from plane landing to the take off was but eight minutes. The actual time paid for was 53 hours and 9 minutes, which shows how closely the estimate was followed. Final costs worked at approximately \$2.71 per acre; well within the \$3.00 limit estimated.

It should be mentioned that the work of the Northwest Air

Service, and its Chief Pilot, Mr. John Blum, was beyond all praise. The Company entered into the spirit of the work in hand, and cooperated in every possible way. There were some anxious moments, engendered by the dangerously low flying with a heavy load in badly broken country, yet the excellence of the Company's equipment and servicing arrangements showed that the awarding of the contract to that Company was fully justified.

While a final report from the Bureau of Entomology is not yet published, an interim report states that "apparently the dusting has checked the defoliation sufficiently North of the Naselle River to prevent heavy defoliation of the trees and has consequently saved an immense amount of timber from destruction this year. In working up the check plots, the best shows a reduction of 88%, and the average four plots in Section 14, shows a reduction of 82% in the loopers, while over the whole area dusted, the average reduction is 45%. It is estimated that the project resulted in the saving of 90,000,000 feet of timber."

The area South of the Naselle is a very badly broken country, with deep ravines and gullies winding and twisting in every direction, offering almost impossible flying conditions. The result of the dusting in this territory is apparently not quite so successful as in the territory North of the river, which has a more even terrain, but still exercised sufficient control as to most thoroughly justify the expense of the experiment.

The mechanics of the operation were as follows: The plane, a six place job, was stripped of its interior fittings; a hopper made of automobile body steel was installed, having a loading entrance coming through the top of the wing, fitted with a hinged cover, and an outlet, controlled by a slide valve, in the base of the fuselage. Two agitators were installed in the hopper, driven by a battery-powered motor. One agitator was set immediately over the valve opening, the other higher and to the rear of the body of the hopper, to keep the dust in motion. The agitators were connected with a roller chain. The size of the outlet was finally fixed by trial and error, and the valve stops set accordingly. A lever controlling the opening valve was installed at the right hand of the pilot. On this lever was a single-throw switch, which operated the agitators. Thus rapid and effective control was a matter of a single movement, both to open and to close the valve, and so regulate the output of dust.

The loading of the plane was accomplished by the erection on the beach at Ocean Park of a hopper 14 feet high, which was spaced sufficiently between the bents to allow for the passage of the tail assembly of the plane. The plane was taxied on to an apron and maneuvered under the hopper by hand. A down spout was led into the plane hopper opening, and the loading hopper opened by a slide. The plane was loaded in a few minutes, run off the apron and was in the air within the time limit set.

The beach made a most excellent landing field, and was kept clear by the co-operation of the Pacific County Commissioners in placing on duty two Deputy Sheriffs.

The chemical, which was packed in 100 pound metal containers, were hauled to the top of the loading platform by block, tackle and auto power.

When the plane left to deposit its load, the loading hopper was filled again in readiness for its return. High relative humidity was essential to the success of the operation, and a close check was kept of this atmospheric condition. To take advantage of this, work started at 4:00 A. M. and on some days, but two loads, or approximately one ton, was distributed, and on the biggest day, 16 loads or eight tons, was spread. Relative humidity and wind velocity were the controls.

There was no hitch in the program. Everything went off as planned, and although the pilots reported on one or two occasions, near accidents due to low flying and disturbed air conditions, yet the fact that 120 flights were safely made, speaks volumes for the excellence of the equipment, the personnel and the skill of the pilots employed.

The results of what was actually an experiment, considering the area involved, and the terrain covered, are gratifying, for the spread of the looper without some control steps being taken, would have been disastrous from all points of view; loss of timber, loss of tax revenue and the creation of a high fire risk. It is sad to report, that on September 30th, Mr. John R. Blum, the Chief Pilot, was killed in an airplane accident which also resulted in the death of his four companions.

This most regrettable occurrence meant the passing of an exceptionally skilled and resourceful pilot. The death of John R. Blum leaves a distinct gap in aviation circles of the Pacific Northwest, and means the passing of a very gallant gentleman.

Co-operation

Our relations with other Forest Protective Agencies continue to be both helpful and cordial.

The press of the State, as a whole, valiantly championed the cause of Forest Protection, and through its columns, repeatedly brought to light the fundamental truth, that Washington largely depends upon its forest using industries, and that the future, no less than the past, must be predicated upon the development and use of forest growth. To the Press we offer our thanks for their help.

The Year's Record

Following is the statistical record of the fire season, with comments on the tables presented. This is the record of the fire season.

	1931	1930	
Number of fires.....	952	1,344	—29%
Area burned over in acres.....	146,111	131,475	+11.13%
Merch. timber killed M B M....	13,185	38,416	—65%
Logs destroyed	19,895	12,184	+63%
Logging equipment burned.....	\$95,524.	\$56,010.	+75%
Settlers property destroyed.....	\$ 8,608.	\$ 5,122.	+68%

The total of fires for the 1931 season was 952, as against 1,344 for 1930; a decrease of 29%.

The wet September of 1931 accounts for this decrease.

The area burned over in 1931 is 146,111 acres as compared with 131,475 acres in 1930, an increase of 14,636 acres, or 11.13%. As pointed out, the increase in the burned over area was almost solely on cutover lands. This is exemplified by the fact that the merchantable timber loss for 1931 is 13,185 M, as against 38,416 M in 1930, a decrease of 65%. Logs destroyed show an increase for 1931, being 19,895 M as against 12,184 M. Again this increase can be accounted for largely by the prevailing increasing practice of cold decking. A cold deck on fire, is nearly always a total loss; a fire running through a setting of felled and bucked logs is always attended by a fairly large percentage of salvage material. The increase in timber and log loss is 63.3%.

Incendiary fires in a measure also account for a portion of this loss of logs, as well as for the increase in the loss of logging equipment. In 1930, equipment loss was \$56,010.00, in 1931, \$95,524.00, an increase of 70.6%. One incendiary fire in Lewis County is responsible for a large percentage of this loss; 3 donkeys, 4 bridges, 2 cold decks, 3 rigged spar trees being burned, 3 settings of felled and bucked timber, together with the blocks and other rigging that usually accompanies loading out and cold deck sides.

The loss to settlers also shows a material increase, although in view of the early season and the large number of fires which ran wild in April during the extremely low humidity period, it is a wonder that the losses are not very much greater than they are shown to be. The State and the Association can point to the fact that the actual values destroyed are comparatively small, due to the energy and intelligence of our field men. The actual figures are \$8,608.00 for 1931 and \$5,122.00 for 1930, an increase of 68%. The settlers' losses for 1929 were \$39,819.00 and for 1928, \$25,413.00, thus showing a marked decrease over those years, being 21.6% and 33.8%, respectively, of 1929 and 1928.

Causes of Fires, Acreage Covered, Timber Loss

Cause—	Number	Per Cent	Acreage Covered	Per Cent	Timber and Logs Destroyed	
					M. B. M.	Per Cent
Lumbering	41	04.3%	25,582	17.5%	4,925	14.9%
Railroads	35	03.7	6,122	04.2	50	00.1
Recreation	343	36.0	17,724	12.1	490	01.5
Land clearing.....	121	12.7	31,464	21.5	17,340	52.7
Slash burning.....	17	01.8	1,358	00.9	300	00.9
Lightning	19	02.7	365	00.3	30	00.1
Incendiary	207	21.7	36,165	24.8	9,905	30.0
Miscellaneous	169	17.8	27,331	18.7	40	00.1
	952	100.0%	146,111	100.0%	33,080	100.0%

This combination table is always interesting because it is one of the few statistical tables which really develop both sides of the problem it is designed to show. Lumbering is shown as being the cause of a remarkably small number of fires, 41, when the risk involved is taken into consideration. Logging always carries a risk, even in normal weather, and this risk is greatly accentuated with falling relative humidities. Siwashing lines, brake shoe sparks, friction of wire rope on block sheaves, frozen blocks, donkey and locomotive sparks, men smoking; all are causes which are likely to start a blaze at almost any time during the summer. There is this known fact, however, to be taken into consideration, that the majority of logging fires are caught in their primary stages, put out, and *not reported*. This occurs largely when the relative humidity is above normal, and while it is a matter of self-congratulation to a company to so extinguish these incipient fires, yet the fact remains that such vigilance often defeats its own purpose because so many fires are easily extinguished. Fires easily extinguished during normal humidities, may be out of control at the start during sub-normal conditions. Too often a false confidence is born in the minds of operators because of their success with the majority of fires, but the damage is done by the minority of fires, which happen to start in bad fire weather. The remedy lies in finding the fire cause and curing it.

The acreage burned by lumbering fires is 25,582 acres, while timber and logs destroyed amount to 4,925 M. In other words, 4.3 per cent of the fires burned over 17.5 per cent of the acreage and accounted for 14.9 per cent of the timber and log loss.

But the cost of lumbering fires is borne by the operator and there is no drain on the public purse for logging operation fires. The operator loses fire fighting wages, timber, logs and equipment, and because of this fact, is the antithesis of the other fire causes.

Railroads also show a small fire occurrence, being responsible for but 35 fires, or 3.7%, burned over 6,122 acres or 4.2% and destroyed timber to the extent of 50 M, or one-tenth of one per cent. Again I submit that the condition of the ground is largely responsible

for this rapid control of fire. Railroads now largely burn their right of way, and remove the inflammable debris; fire thus gets a slow start. Obviously, slash burning has its merits as a fire control measure, and is to be commended.

Once again we have to point to a curious contradiction which seems to decrease only as the season's severity decreases. Recreation, under which heading comes campers, hikers, berry pickers and hunters, is responsible for 343 or 36% of the number of fires, which burned over 17,724 acres or 12.1 per cent of the total area burned during 1931, and were responsible for the loss of 490 M feet of timber and logs or 1.5% of the total. Here again is cause for study. While responsible for 36 per cent of all fires, recreation is responsible for 12.1 per cent of the acreage and 1.5 per cent of property loss, as compared with 17.5 per cent of acreage covered and 14.9 per cent of timber loss charged to lumbering. But, as pointed out, the logger cannot operate without some risk, any loss which occurs is definitely his own, while the "recreation" fire is a tax upon the land owners and is an unnecessary cause which should not occur in a community with a real sense of civic responsibility. Logging is an industrial operation, upon which 65 per cent of the wage earners of this State depend, and the army of men employed in normal times in the woods are setting a wonderful record, when the inherent risk is taken into consideration. The recreationist is, in the largest degree, a trespasser upon the lands of others; he pays no tax upon such lands as he may gather berries upon, hunt over, or pass through for fishing, camping or hiking purposes. Yet the carelessness, whether accidental or otherwise, of this class is a tax upon all owners of wild land, who pay for protection rendered necessary through acts other than their own. This carelessness with fire means the reduction of values in forest land, through destruction of second growth, and so tends to increase the number of tax delinquencies, which will naturally reflect upon the tax revenue of the Counties. The State, the Counties and the Public must co-operate in the effort to eliminate the waste of money and land values through the carelessness of the recreation seeker.

Land Clearing is responsible for 121 or 12.7% of fire causation, burning over 31,464 acres of land, or 21.5%, and destroyed timber and logs to the extent of 17,340 M or 52.7% of the total loss.

Again I invite the land clearer to note this fact. Practically every year, land clearing fires get out of control and burn over large areas and destroy values for which they are not, as a rule, financially responsible. Land clearing is a problem of the agriculturist; he must use fire in his operations, but it is submitted that a great deal of trouble and loss would be eliminated if the land clearer used more precautionary methods as to the time of setting out fires and care after they are set. Permit fires which get out of control, are by law a lien upon the property and earnings of the responsible land clearer, and sooner or later this lien will be increasingly exercised for the self-preservation of the damaged land owner. There is no doubt

but that there is a marked desire on the part of the responsible land clearer to comply with the permit laws of the State, but in common with other things, there is still room for improvement.

Some 20,000 acres of slash was burned this year. Such fires are of necessity set at a time when the debris will be consumed, and there must, of necessity, always be somewhat of a risk attached to this operation, but with due precautions taken as to weather trends and rainfall predictions, the risk is minimized. If slash fires are set when the weather is such that a slash fire is "safe," i. e., that no possible damage can possibly result, then such a fire is useless, for it will not effect its purpose, which is to burn the logging debris hard and clean. Therefore, when set slash fires, which ran somewhat out of control to the number of 17, forming 1.8% of the total, and burn over 1,358 acres beyond the boundaries of the area sought to burn, comprising 0.9% of the total, it becomes obvious that slash burning is far more effectually controlled than are land clearing fires.

Lightning fires to the number of 19, or 2.7%, occurred. This cause is beyond our control, and for these fires we must mainly rely upon our lookouts for detection. But 365 acres, or 0.3%, were burned over by these fires, and 30,000 feet of timber, or one-tenth of one per cent, was destroyed. This speaks for itself.

Incendiary fires were very prevalent this year. This has already been referred to in detail. With 21.7% or 207 fires so set, 36,165 acres, or 24.8% of acreage, and 9,905 M or 30% of timber destroyed, the story is fully told, except this significant detail; such fires were set where property values necessitated the strongest suppression measures be taken. Western Washington has been fortunate in that no deaths resulted directly from such incendiary fires, such as occurred in Eastern Washington and Idaho this year.

Miscellaneous causes account for the balance of 169 or 17.8% of fire occurrence, burning 27,331 acres or 18.7% of the total and destroying 40,000 feet of timber, or three-tenths of one per cent.

A further classification of fire occurrence is that 215 or 22.6% of all fires fought were extinguished under one-quarter of an acre, 542 or 57% under 40 acres, and 195 or 20.6% over 40 acres. This division into Class A, B and C fires further shows the efforts of your field forces.

The effect of slash burning is noted in that 43,394 acres of reproduction area, on which the slash was not disposed of, was burned, while 22,624 acres of reproduction area, from which the slash had been removed, was destroyed. This is approximately 47% of the unburned slash reproduction area.

This is the season's record, which started in mid April, and finished early in September. The loyalty and energy of the field men is written into the statistical record.

All of which is respectfully submitted.

C. S. COWAN, *Chief Fire Warden.*

TABLE SHOWING BURNED AREAS AND LOSSES BY COUNTIES FOR SEASON 1931

COUNTY	AREA BURNED OVER IN ACRES										TIMBER & LOGS DAMAGED IN FT. B. M.		OTHER LOSSES	
	FOREST LANDS			NOT REFORESTED			NON-FOREST LANDS							
	Merch. Timber	REPRODUCTION		Old Burn	CUT OVER		Pasture	Brush Lands	Other Lands	TOTAL				
		Cut Over	Old Burn		Slash Unburned	Burned Over								
Clallam.....	40	18	3	743	2,561	50	.....	97	3	3,515	80	.....	\$	\$
Clark.....	80	41	5,590	733	5	52	15	109	1,318	7,943	.....	.....	300.00	629.00
Cowlitz.....	360	9,341	1,846	1,507	463	3,190	10	447	5	17,169	1,935	2,020	7,050.00	70.00
Grays Harbor.....	5	55	684	2,363	8,976	7,017	32	2	583	19,717	.....	.....	50.00	100.00
Island.....	.....	58	60	2	8	4	1	15	16	164	.....	.....	.....	.....
Jefferson.....	4	20	70	520	126	25	.....	104	.....	869	.....	.....	.....	.....
King.....	110	7,703	3,211	1,883	6,028	4,963	269	1,480	2,104	27,751	1,035	300	.....	1,200.00
Kitsap.....	.....	68	41	340	1,066	1	.....	5	1	1,522	.....	.....	1,000.00	.....
Lewis.....	984	4,922	221	111	1,848	1,340	61	120	31	9,638	3,775	6,300	25,075.00	135.00
Mason.....	202	4,996	2,770	1,117	3,941	596	201	124	10	13,957	50	25	1,500.00	1,780.00
Pacific.....	48	4,402	2	270	3,540	201	12	19	.....	8,494	465	11,000	48,000.00	.....
Pierce.....	874	9,660	3,182	2,233	4,276	330	226	707	172	21,660	5,430	.....	855.00	3,563.00
Skagit.....	262	851	387	726	885	50	.....	205	82	3,448	65	.....	.....	.....
Skamania.....	80	.....	3,260	350	360	.....	10	1	513	4,574	.....	.....	.....	600.00
Snohomish.....	10	494	39	284	247	100	67	587	123	1,951	150	.....	.....	.....
Thurston.....	125	150	362	17	102	80	110	244	1	1,191	100	50	.....	.....
Wahkiakum.....	.....	.....	.....	80	133	.....	40	50	.....	303	.....	200	11,659.00	.....
Whatcom.....	100	615	896	.....	326	.....	.....	158	150	2,245	100	.....	35.00	150.00
Totals.....	3,284	43,394	22,624	13,279	34,891	17,999	1,054	4,474	5,112	146,111	13,185	19,895	\$95,524.00	\$ 8,608.00

TABLE SHOWING ORIGIN AND NUMBER OF FIRES FOR SEASON 1931

COUNTY	Lightning	Incendiary	RECREATION		LUMBERING		Brush Burning	Railroad	Miscel. and Unknown	Total	CLASS		
			Camp Fires	Smokers	Slash Burning	Logging					A	B	C
Clallam.....	....	9	4	11	1	....	1	....	7	33	6	22	5
Clark.....	....	3	2	19	....	1	8	1	10	44	5	28	11
Cowlitz.....	1	11	6	10	1	5	3	2	13	52	12	26	14
Grays Harbor.....	....	22	8	22	1	2	5	....	10	70	13	43	14
Island.....	....	10	14	13	....	....	13	....	7	57	33	22	2
Jefferson.....	....	13	6	7	....	....	5	....	1	32	8	21	3
King.....	5	11	6	47	2	1	22	4	18	116	23	61	32
Kitsap.....	1	9	2	6	2	2	4	....	2	28	6	17	5
Lewis.....	....	27	4	13	3	7	8	5	16	83	15	57	11
Mason.....	....	26	3	13	....	3	....	1	25	71	4	45	22
Pacific.....	1	....	1	8	....	1	6	4	6	27	5	13	9
Pierce.....	1	18	7	24	3	4	13	9	15	94	9	63	22
Skagit.....	5	12	9	20	4	6	10	3	8	77	40	24	13
Skamania.....	....	1	1	....	....	2	1	1	6	12	1	7	4
Snohomish.....	3	23	10	19	....	1	13	2	13	84	22	53	9
Thurston.....	....	4	....	16	....	1	....	3	6	30	1	22	7
Wahkiakum.....	1	....	....	1	....	3	3	....	1	9	1	4	4
Whatcom.....	1	8	4	7	2	6	5	33	11	14	8
Totals.....	19	207	87	256	17	41	121	35	169	952	215	542	195

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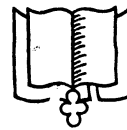
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